**MICHIGAN ENVIRONMENTAL SCIENCE BOARD**

**INDOOR AIR INHALATION INVESTIGATION PANEL**
**MEETING SUMMARY**
**TUESDAY JUNE 19, 2000**
**COURTYARD BY MARRIOTT**
**7799 CONFERENCE CENTER DRIVE**
**BRIGHTON, MICHIGAN**

**PANEL MEMBERS PRESENT**
Dr. Lawrence Fischer, Chairman
Dr. Ralph Kummler
Dr. Linda Abriola
Mr. Keith G. Harrison, Executive Director

**MDEQ/OSEP SUPPORT STAFF PRESENT**
Mr. Jesse Harrold, Environmental Officer

## I. CALL TO ORDER

Dr. Lawrence Fischer called the meeting of the Michigan Environmental Science Board (MESB) Indoor Air Inhalation Investigation Panel (Panel) to order at 9:10 a.m.

## II. EXECUTIVE DIRECTOR'S UPDATE

Mr. Keith Harrison discussed briefly the literature that had been transmitted to the Panel since the last meeting and also the anticipated date of transmittal of the remaining requested documents.

## III. PANEL DISCUSSION

Dr. Fischer noted that Dr. Ralph Kummler had been given the assignment of writing on input parameters and assumptions used in the Johnson & Ettinger model. Dr. Kummler responded that there is substantial information on sensitivity analysis, which he had evaluated, but there are inadequate data regarding overall validation of the model. Dr. Linda Abriola noted that the model was based on well-understood principles of physics, but application of the model to buildings with many variable and possibly unknown parameters could be difficult. She stated that her major concern is that the generic parameters may not be protective enough, and that there is little information about indoor air concentration versus ground contamination. Dr. Kummler added that another concern is that the model is one-dimensional and perhaps over-simplified, however, the indoor air pathway needs to be addressed. He noted that with five or six important parameters, the combined result of all conservative values could be much too conservative.

Dr. Fischer asked whether parameters for the model were representative of the actual movement of gas or if they might be chosen differently if an effect other than protection of public health was the primary consideration. Mr. Jeff Crum (Environmental Response Division, Michigan Department of Environmental Quality, MDEQ) replied that there were limiting aspects in development of the generic input assumptions. While soil criteria previously established by the U.S. Environmental Protection Agency (USEPA) used a loam type soil, some parts of the state have a predominantly clay type soil. There were also established soil saturation screening concentrations and soil leaching to groundwater criteria based on a loam. Mr. Crum noted that in some cases where a distinct health outcome was seen in a group of people, the specific soil type encountered might need to be considered. Mr. Andy Hogarth (MDEQ) added that if the soils in a particular case were consistent with loam, or less permeable, then the generic criteria could be used.

Mr. Crum noted that the soil vapor permeability value is the most sensitive input assumption in the model. In an effort to assure that the final result would be protective, a sandy loam type soil was chosen as the generic input value for this parameter. There are some soils that are more sandy than this, but sand was not chosen for the generic criteria as this could compound the conservatism already established by the other criteria. Some toxicologists have set the target of being protective in 95 percent of cases. This acknowledges that there is always the possibility of a situation where the chosen criteria are not protective.

Mr. Crum stated that contact rate, exposure duration, and intake rate are the three most sensitive values in the exposure part of a risk-based equation. These can be set at upper end values and combined with central tendency estimates for body weight and skin surface area to achieve 95 percent protection. Dr. Abriola noted that determination of the exact degree of protectiveness would require a database of the types of soil regionally, the depth to the water table, and the indoor air ventilation for various sites. She added that she was concerned that the MDEQ generic criteria are higher, and thus less protective, than those used by the USEPA. Mr. Crum stated that the values developed by the DEQ for reference concentrations of non-carcinogenic chemicals and inhalation unit risk factors for carcinogenic chemicals were based on a continuous 24-hour day exposure, and were also designed to be conservative.

Dr. Abriola noted that some values in the model, such as the air exchange rate and the crack percentage, were not very conservative. Mr. Crum replied that the crack area value falls within the range of actual measured values, seen in evaluation of Canadian homes. He added that there is a fairly good database for all the parameters selected, but there could be some uncertainty in the contribution of individual parameters to the conservatism of the combined result. Dr. Abriola noted that while the scientific basis for individual parameters is established, the actual distribution and range of values for these parameters in Michigan is unclear.

Mr. Hogarth noted that if the model was valid and conditions at a site were well defined, then it would be possible to demonstrate validation of the model. Dr. Kummler replied

that it was not really possible to use a three-dimensional approach to validate a one-dimensional model. He asked whether there were any requirements for indoor air measurements after construction on a building is finished, in order to build a database. Mr. Hogarth replied that although this was done in certain circumstances, it was not uniformly done and a regulation to require this would be very difficult to enforce.

Dr. Abriola indicated that while there is concern about whether assumptions in the model are protective enough, comparing indoor air quality versus soil and groundwater concentrations is the only defensible way to develop generic criteria. Dr. Fischer noted that the Panel had been asked to provide input on whether there are other equally defensible approaches for evaluating risk in this pathway. He added that one way to estimate risk would be to monitor indoor air to get a value to calculate the risk. Dr. Abriola restated that the database does not exist to equate air concentrations with exact risk or degree of protectiveness. Mr. Crum added that regulatory standards are set in order that the soil concentrations will not produce higher than acceptable air concentrations.

Dr. Abriola asked what happened when contaminated groundwater is not regulated due to a deed restriction stating the water is not to be used for drinking. Mr. Hogarth responded that when the statute was changed in 1995, allowing exceptions to meeting drinking water criteria, other pathways became the controlling factors in protecting the public. Dr. Kummler added that some of the literature he had reviewed would be helpful in identifying the most sensitive parameters, however, it would be difficult to say whether any of the parameters were completely adequate at this point. He noted that there was technology available to decrease risk, such as installation of a vapor seal to eliminate the problem of seepage through cracks. Mr. Hogarth stated that choosing lower, and more protective, values for the parameters would result in more sites being in violation. If parties responsible for cleanup at these sites did not want to achieve the generic criteria, they could choose to use alternative site-specific criteria, with possible engineering controls put in place to achieve compliance. The cost would be borne by the site owner. The MDEQ would only be responsible for costs at state-owned sites, and minimal costs for reviewing the cases of parties interested in site-specific modeling. Costs for contaminated sites include both the actual cleanup costs and additional investigative costs to determine soil types.

Mr. Harrison indicated that it was his understanding that the purpose of the generic criteria was to allow for a process to quickly move through the regulatory process in a reasonable manner, with site-specific plans available for development as needed. He added that pursuant to the Governor's charge to the MESB, the cost of the various options was not an issue for the MESB to determine in this case.

Dr. Kummler asked whether there was a review of the outdoor to indoor air pathway as to its impact on human health. Dr. Abriola noted that there was literature on radon, which uses the same pathway and mechanism of movement. Mr. Crum stated that case histories of occupational exposure of this type would be rare. Dr. Abriola asked whether the Colorado study could be analyzed to see whether the Michigan generic

criteria were exceeded in that case. Measured groundwater contamination levels could be used in the model and the effect predicted and then compared against actual levels of indoor air contaminants. This could show whether the criteria were reasonable. Mr. Crum stated that this had not been done but might be possible. Mr. Hogarth said that his office would try to provide such an analysis to the Panel within a few weeks. Mr. Crum added that there were possibly other sites in California and Washington that have been evaluated and might provide useful data. Dr. Kummler suggested re-contacting Mr. Ian Hers to see if he had any additional data on measured groundwater concentrations related to levels found in the indoor air.

Dr. Fischer asked if there were points on which the Panel was in agreement, in order to direct the actual writing of the report. Dr. Kummler replied that although the model in question appears to be reliable and technically defensible, the database supporting that model is not available. He clarified that there were insufficient data to evaluate the effectiveness of the model in protecting human health. However, the process whereby generic criteria are implemented seems to be reasonable, with site-specific values as a viable option.

Dr. Fischer asked for opinions from the group on whether public health was being threatened by continued use of the current generic criteria. Dr. Kummler responded that this was still unknown at this point. Dr. Abriola stated that all the criteria were not conservative, but were mixed, as they were intended to be somewhat balanced. She commented that the criteria could be made more stringent to ensure safety, but the economic cost might be prohibitive.

Dr. Fischer stated that the state had the option of taking measurements and collecting additional data. However, Mr. Crum noted that this would be an extremely exhaustive effort requiring data collection over a year. Mr. Hogarth added that the data needed would be examples of when ground contamination levels were just below the criteria, and the indoor air was acceptable. This would help to demonstrate protectiveness of the criteria. It could be difficult to find appropriate example cases in order to generalize, but with enough data, a distribution curve could be calculated. Also background levels of substances in indoor air would have to be separated from the effects of the soil. Dr. Abriola commented that because the generic criteria under consideration were lower than those used by agencies such as the USEPA, there needs to be a good basis for stating that these are more reasonable or realistic.

## IV. PUBLIC COMMENT

Ms. Anne Wallin (Dow Chemical, Michigan Chemical Council) stated that risk assessment is an inherently conservative process and that being overly conservative is costly. She noted that engineering controls could not be used if there was no building present. Ms. Wallin added that warehouse property does not generally present a real threat, but that many properties are not developed or sold because contamination criteria are overly conservative. Mr. Hogarth responded that not selling is one choice, or the property could be sold with a deed restriction.

## V. PANEL ASSIGNMENTS

Dr. Fischer noted that the issue of input parameters and assumptions was being covered by Dr. Kummler with Dr. Abriola discussing the physical nature of the model. Dr. Long would be responsible for reviewing the pertinent case studies, including those from Colorado, Massachusetts, and British Columbia, while he would cover the toxicology portion. Mr. Harrison would be responsible for all the introductory material and for blending all the individual report pieces into a single document. The entire Panel would review all the portions of the report in order to better come to a consensus on the final conclusions.

## VI. ADJOURNMENT

The meeting was adjourned at 12:30 p.m.

Keith G. Harrison, M.A., R.S., Cert. Ecol.
Executive Director
Michigan Environmental Science Board